ENGINEERING DESIGN GUIDELINES

for

SUBDIVISIONS OR COMMERCIAL DEVELOPMENTS

City of Birmingham
Department of Planning, Engineering and Permits
Engineering Division
Office of the City Engineer

2005

TABLE OF CONTENTS

ARTICLE 1 - GENERAL

1.1 Introduction.

a. This document is intended to provide engineers with general information that will assist in the preparation of civil engineering plans that comply with the requirements of the City of Birmingham.

b. Proposed projects shall comply with the requirements of the City of Birmingham's *Standard Specifications for the Construction of Public Works Projects*, latest edition, *Subdivision Regulations*, and these guidelines.

c. It is recognized that materials and/or construction methods may need to be specified for which the City does not have standard specifications. In such cases, the engineer may reference other standard specifications, e.g., ALDOT, AIA, etc.

1.2 Engineering Division Permits.

a. All projects that involve the installation of public works must be issued a *Civil Construction* permit. For purposes of this document, public works include, but are not limited to, public streets or roads, public sidewalks, public or private storm sewers including stormwater detention/retention facilities.

b. A *Building* permit **does not** authorize the installation of any public works.

c. It is recommended that one (1) set of civil engineering drawings and any other documentation required by this document be submitted for a preliminary review prior to applying for the *Civil Construction* permit. Plans may be submitted to:

Land Development Engineer
2nd Floor, Comer Building
808 18th Street N.
Birmingham, AL 35203

d. Submittals required for the *Civil Construction* permit include four (4) sets of the civil/public works sections of the project plans and a completed permit application. Application may be made in:

Room 210, City Hall
710 20th Street N
Birmingham, Alabama, 35203
(See Appendix C)

e. Plans submitted for approval shall:

1. Contain a note stating that the proposed work will be done in accordance with the latest edition of the City of Birmingham's *Standard Specifications for the Construction of Public Works Projects*, and

2. Be signed, sealed and dated by a licensed professional engineer, qualified in civil engineering, in good standing with the State Board of Licensure for Professional Engineers and Land Surveyors, and licensed to practice in the state of Alabama.

f. Plan reviews are usually completed within five (5) business days.

g. All projects shall comply with the *Soil Erosion and Sediment Control Ordinance*. The *Clearing*

and/or Earthwork permit associated with this ordinance is issued through a separate review and approval process. See Appendix C.

h. Other permits issued by the Engineering Division that may be required depending on the scope of the work include the following:

1. *Driveway/Sidewalk/Sidewalk Opening/Vault*

2. *Excavation*

3. *Blasting*

4. *Curb Crossing*

These permits may be obtained in Room 210, City Hall. City staff will assist in determining which permits are necessary on each project.

i. Permit applications may be downloaded from the City of Birmingham's website at www.informationbirmingham.com.

j. The foregoing deals only with permits issued by the Engineering Division of the Department of Planning, Engineering and Permits. There may be other permits, certifications, and/or approvals required by other divisions of the Department of Planning, Engineering and Permits as well as other departments, i.e., Zoning, Urban Planning, Traffic Engineering, Building and Inspections, etc.

ARTICLE 2 - SANITARY SEWERS

2.1 General.

a. Owners/developers shall submit plans for proposed sanitary sewers to the Jefferson County Environmental Services Department for review and approval. This requirement shall include any form of construction or work that may impact, conflict with, or interfere with any sanitary sewer facility and/or easement.

b. Owners/developers shall provide to the City Engineer a set of plans that have been stamped, initialed or otherwise marked as approved by the Director of the Jefferson County Environmental Services Department indicating that Environmental Services has reviewed and approved any proposed sanitary sewer construction or any form of construction or work that may impact, conflict with, or interfere with any sanitary sewer facility and/or easement. The City of Birmingham will not issue any permits until these plans are on file with the City Engineer.

c. It shall be the owner/developer's responsibility to notify the Jefferson County Environmental Services Department prior to beginning any sanitary sewer construction work.

d. An *Excavation* permit will be required if installing a sanitary sewer within a right-of-way located within the city limits of Birmingham. This permit may be obtained in Room 210, City Hall.

ARTICLE 3 - STORM SEWERS

3.1 Method of Determining Runoff.

a. Stormwater runoff may be estimated using any currently accepted engineering method. The engineer of record shall be responsible for selecting an appropriate method.

b. Storm sewer systems shall be designed to be adequate in terms of capacity for the developed condition of the drainage area being served, i.e., assuming the drainage area is completely developed in accordance with its current zoning.

3.2 Return Periods.

a. The minimum return period to be used in the design of storm sewer collection systems shall be the 10-year return period.

b. The minimum return period to be used in the design of box culverts and pipes larger than 60" shall be the 25-year return period.

c. Return periods greater than the minimums may be used as determined by the engineer of record.

d. Care should be exercised when selecting a return period so that downstream storm sewer systems are not adversely affected.

3.3 Design.

a. In general, the *Manning Equation* shall be used to size drainage structures.

b. A *Manning's* "n" of 0.013 shall be used to size concrete pipe and box culverts.

c. In developed areas, the proposed drainage system shall be compatible with the existing drainage system. The owner/developer may be required to upgrade the existing system to accommodate the stormwater runoff from the proposed development.

d. The minimum pipe diameter for a storm sewer shall be 18 inches.

e. Storm sewer pipe shall be a minimum of Class 3 reinforced concrete if the storm sewer: 1) is to be transferred to the City of Birmingham for maintenance, 2) is located in a recorded easement, and/or 3) conveys offsite stormwater runoff through a site.

f. Pipe materials other than reinforced concrete may be used on systems that do not meet the criteria stated in 3.3e.

g. The crowns (inside tops) of pipes shall match wherever practical when changing pipe sizes.

h. In general, all drainage structures shall be extended to the limits of the development.

i. Box culverts shall be designed for AASHTO HS-20 loading in vehicular traffic areas (existing or potential) and HS-15 loading in all other areas.

j. Manholes or inlets shall be placed at: 1) changes of direction, 2) changes in grade, 3) junctions with other pipe, 4) where needed to drain an area, or 5) every four hundred (400) feet, whichever of these distances is less.

k. Manholes, inlets, headwalls, etc., shall comply with the details on file in the Department of Planning, Engineering and Permits.

3. 4 Flood Plains. The Federal Emergency Management Agency (FEMA) may have more stringent requirements for storm sewer systems located within a flood hazard zone. It is the engineer of record's responsibility to determine if a storm sewer system will be within a flood hazard zone and to design it in accordance with FEMA's requirements.

3.5 Work Products to be Submitted.

a**.** Prior to being issued a *Civil Construction* permit.

i. Plans signed, sealed and dated by a licensed professional engineer, qualified in civil engineering, in good standing with the Alabama State Board of Licensure for Professional Engineers and Land Surveyors, and licensed to practice in the state of Alabama.

ii. Two copies of the engineering calculations.

iii. Statement by the engineer of record relative to the impact of the proposed storm sewer system on the existing storm sewer system (see Appendix B).

b. Prior to the system being accepted for maintenance by the City of Birmingham.

i. Statement from the engineer of record that the storm sewer system was built in accordance with the plans on file in the Department of Planning, Engineering and Permits.

ii. As-built drawings of the system.

ARTICLE 4 - STORMWATER DETENTION/RETENTION FACILITIES

4.1 General.

a. The policy of the City of Birmingham relative to stormwater detention/retention is that the post-development runoff rate equals the pre-development runoff rate. Specific means and methods of achieving this goal are the responsibility of the engineer of record but shall reflect currently accepted engineering methods.

b. The operation and maintenance of the stormwater detention/retention facility shall be the responsibility of the owner/developer. The engineer of record shall be responsible for instructing the owner/developer in the proper operation and maintenance of the facility.

c. Any liability associated with the design, performance and operation of the stormwater detention/retention facility remains with the owner/developer and the engineer of record.

4.2 Design.

a. The detention/retention facility including the principal spillway or outlet structure shall be designed based on runoff estimates for a rainfall event with a 25-year return period.

b. The emergency spillway shall be designed to accommodate the estimated runoff from a rainfall event with a 100-year return period without catastrophic damage to the facility or downstream areas.

c. Stormwater Detention/Retention facilities shall be designed by routing a hydrograph through the facility. No “shortcut” or storage estimation methods shall be used as a final design. Methods based on the Natural Resources Conservation Service's unit hydrograph are recommended for developing hydrographs. However, any acceptable method will be considered.

4.3 Flood Plains. The Federal Emergency Management Agency (FEMA) may have more stringent requirements for stormwater detention/retention facilities that are located within a flood hazard zone. It is the engineer of record’s responsibility to determine if a stormwater detention/retention facility will be within a flood hazard zone and to design it in accordance with FEMA's requirements.

4.4 Work Products to be Submitted.

a**.** Prior to being issued a *Civil Construction* permit.

i. Plans signed, sealed and dated by a licensed professional engineer, qualified in civil engineering, in good standing with the Alabama State Board of Licensure for Professional Engineers and Land Surveyors, and licensed to practice in the state of Alabama.

ii. Two copies of the engineering calculations.

iii. Statement by the engineer of record relative to the impact of the proposed stormwater detention/retention facility on the existing storm sewer system (see Appendix B).

b. Upon completion of the facility.

i. Statement from the engineer of record that the stormwater detention/retention facility was built in accordance with the plans on file in the Department of Planning, Engineering and Permits.

ii. As-built drawings of the system.

iii. Copy of the maintenance guidelines for the stormwater detention/retention facility.

ARTICLE 5 - ROADWAYS

5.1 Design.

a. Geometric design parameters shall follow those specified in the City of Birmingham's *Subdivision Regulations* and/or AASHTO's guidelines found in *A Policy on the Geometric Design of Roadways and Streets*, latest edition. AASHTO's *Roadside Design Guide*, latest edition, shall be used to determine clear zone and guardrail requirements.

b. In general, roadways with curb & gutter shall be designed such that runoff from property abutting the roadways will flow over the top of the curb. Topographical conditions may not allow this guideline to be followed in all cases.

c. Asphalt Pavement Buildup.

i. The engineer of record shall determine an appropriate pavement buildup based on an analysis of anticipated traffic volumes and soil conditions.

ii. The minimum pavement buildup shall be six (6) inches of crushed stone base, two (2) inches of asphalt binder, and one (1) inch of asphalt seal.

d. Driveways.

i. Any turnout (driveway) that provides access to private property shall be concrete from the gutter line to the property line.

ii. The minimum radii for driveway turnouts shall be five (5) feet for residential driveways and ten (10) feet for commercial driveways. These dimensions may be modified by the City Engineer and/or the City Traffic Engineer on a case-by-case basis.

iii. Residential driveways over fifteen (15) feet in width and all commercial driveways shall be approved by the City Engineer, City Traffic Engineer and Chief Planner.

iv. The location of driveways in relation to street intersections shall be reviewed and approved by the City Traffic Engineer on a case-by-case basis.

e. All curb inlets on improved roadways shall be City of Birmingham Type AF or HF. Details of these inlets are on file in the Department of Planning, Engineering and Permits.

f. In general, streets shall be designed without using superelevation. Circumstances may not allow this requirement to be followed in all cases.

g. The remainder of this section is taken from *Article IV Design Standards* of the City of Birmingham's *Subdivision Regulations*, June 1962.

h. Minimum Widths.

Roadway Type	Minimum Right-of-Way	Minimum Pavement Width*
Freeway and/or Expressway	200 Feet	-
Major Arterial	100 Feet	66 Feet
Minor Arterial	80 Feet	52 Feet
Collector	60 Feet	36 Feet
Local	50 Feet	27 Feet

* Measured from face of curb to face of curb.

i. Minimum Collector Street Design Standards.

	Topographic Gradients		
Standard	0-8%	8.1 - 15%	Over 15%
Right-of-way Width (Feet)	60	60	60
Pavement Width* (Feet)	36	36	36
Minimum Sight Distance (Feet)	250	200	150
Maximum Grade	12%	12%	12%
Minimum Centerline Radii (Feet)	350	230	200
Sidewalks (Minimum width in feet)	4	4	4

*Measured from face-of-curb to face-of-curb

i. The minimum distance between the facing of the curb and the required sidewalk shall be three (3) feet.

ii. All curbs and gutters installed in conformity with these regulations shall be minimum six (6) inch vertical face with one (1) foot of gutter, or an overall width of combined curb and gutter of eighteen (18) inches.

iii. The minimum spacing of collector street intersections along any major arterial or minor arterial street shall be one thousand three hundred (1300) feet from centerline to centerline.

iv. All commercial or industrial service streets shall be constructed to the minimum collector street standards.

j. Minimum Local Street Design Standards.

Standard	Topographic Gradients 0-8%	8.1 - 15%	Over 15%
Right-of-way Width (Feet)	50	50	50
Pavement Width* (Feet)	27	27	27
Minimum Sight Distance (Feet)	200	150	110
Maximum Grade	15%	15%	15%
Maximum Cul-de-sac Length Single Family District (Feet)	1000	1000	1000
Maximum Cul-de-sac Length Multi-Family District (Feet)	500	500	500
Minimum Centerline Radii (Feet)	250	175	150
Sidewalks (Minimum width in feet)	4	4	4

*Measured from face-of-curb to face-of-curb.

i. The minimum distance between the face of the curb and the required sidewalk shall be three (3) feet.

ii. All cul-de-sacs shall terminate in a circle with a radius of not less than fifty (50) feet.

iii. All curbs and gutters installed in conformity with these regulations shall be minimum six (6) inch vertical face with one (1) foot of gutter, or an overall width of combined curb and gutter of eighteen (18) inches.

iv. All sidewalks installed in conformity with these regulations shall be along at least one (1) side of all local streets except no sidewalks shall be required on cul-de-sacs five hundred (500) feet or less in length in single-family subdivisions. Sidewalks shall be installed on both sides of all local streets within two thousand (2000) feet of a school.

k. Design Standards for Streets not Classified as Freeways, Major Arterial or Minor Arterial.

Standard	Topographic Gradients 0-8%	8.1-15%	Over 15%
Clear horizontal sight distance (Length in feet along each approach leg)	90	90	70
Vertical alignment within 100 feet of the centerline of intersections	5%	5%	5%

i. The minimum centerline offset of adjacent street intersections shall be as follows:

Local - Local	150 Feet
Local - Collector	150 Feet
Collector - Collector	150 Feet

l. Street alignment shall be designed to eliminate sharp curves and street jogs. Streets shall intersect at right angles if possible and in no case at an angle of less than seventy (70) degrees.

m. Curb radii of collector and local streets shall be as follows:

Local - Local	25 Feet
Local – Collector	25 Feet
Collector - Collector	25 Feet

n. Streets shall be graded to a minimum line of seven (7) feet back of the curb line with a rise of not less than eight (8) inches nor more than fifteen (15) inches from the flow line of the gutter unless the topography is such as to make this prohibited.

5.2 Work Products to be Submitted.

a. Prior to being issued a Civil Construction permit.

i. Plans signed, sealed and dated by a licensed professional engineer, qualified in civil engineering, in good standing with the Alabama State Board of Licensure for Professional Engineers and Land Surveyors, and licensed to practice in the state of Alabama.

ii. Two copies of the engineering calculations.

b. Prior to the system being accepted for maintenance by the City of Birmingham.

i. Statement from the engineer of record that the project was built in accordance with the plans on file in the Department of Planning, Engineering and Permits.

ii. As-built drawings of the project.

APPENDIX A

Rainfall Intensity Equations for Birmingham, Alabama

$$i_{2yr} = \frac{80}{(t_c + 15)^{0.867}}$$

$$i_{5yr} = \frac{86}{(t_c + 15)^{0.846}}$$

$$i_{10yr} = \frac{88}{(t_c + 15)^{0.818}}$$

$$i_{25yr} = \frac{90}{(t_c + 15)^{0.785}}$$

$$i_{50yr} = \frac{96}{(t_c + 15)^{0.780}}$$

$$i_{100yr} = \frac{93}{(t_c + 15)^{0.743}}$$

Where: i is the intensity in in/hr

t_c is the time of concentration in minutes, minimum t_c=5 minutes

Equations derived from I-D-F curves for Birmingham, Alabama.

APPENDIX B

The certification on the following page (or an adverse effects letter) shall be submitted for all projects.

CITY OF BIRMINGHAM
DEPARTMENT OF PLANNING, ENGINEERING & PERMITS
ENGINEERING DIVISION
Field Office
2nd Floor, Comer Building
808 18th Street North
Birmingham, Alabama 35203

Dr. Bernard Kincaid
Mayor

William A. Gilchrist, AIA
Director

STORM SEWER SYSTEM CERTIFICATION

I certify that I am a licensed civil engineer in the State of Alabama and further certify that the plans provide for proper drainage of the project according to sound engineering principles; all portions of the on-site storm sewer system empty into existing natural drainways or storm sewers; the capacity of each such drainway or storm sewer is not exceeded by the system designed; and the post-development runoff rate does not exceed the pre-development runoff rate.

Project Name: _____

_____
Signature of Licensed Individual

_____
Print or Type Name

License No. _____ Date _____

Return To: Land Development Engineer
2nd Floor, Comer Building
808 18th Street North
Birmingham, AL 35203

APPENDIX C

DIRECTORY

Building Permits	(205) 254-2254
Fax	(205) 254-2111
Address:	Room 210, City Hall 710 20th Street N. Birmingham, AL 35203
City Engineer	(205) 254-2361
Fax	(205) 254-2407
Address:	Room 220, City Hall 710 20th Street N Birmingham, AL 35203
Civil Construction Permits	(205) 254-2259
Fax	(205) 254-2023
Address:	Room 232, Comer Building 808 18th Street N. Birmingham, AL 35203
Clearing and Earthwork Permits	(205) 254-2259
Fax	(205) 254-2023
Address:	Room 232, Comer Building 808 18th Street N. Birmingham, AL 35203
Permit Applications	(205) 254-2333
Fax	(205) 254-2111
Address:	Room 210, City Hall 710 20th Street N. Birmingham, AL 35203
Website	www.informationbirmingham.com/planning/index.htm

APPENDIX D

Engineering Division Permits Checklist

Developer/Engineer

___ Resolve any zoning, flood plain and/or subdivision issues

___ Jefferson County Environmental Services Sanitary Sewer Approval

___ Submit civil portion of project plans for preliminary review

___ Planning, Engineering and Permits

___ Flood Plain Administrator

___ Clearing and/or Earthwork

___ Civil Construction

___ Submit certifications

___ Traffic Engineering

___ Incorporate comments into plans

Contractor

___ Apply for Clearing and/or Earthwork permit

___ Complete application

___ Submit plans

___ Post bond

___ Pay fee

___ Apply for Civil Construction permit

___ Complete application

___ Submit plans

___ Pay fee

___ Apply for other applicable permits

___ Excavation

___ Driveway/Sidewalk/Wheelchair Ramp

___ SidewalkOpening/Vault

___ Blasting

___ Barricade

___ Curb Crossing

___ Notify Jefferson County Environmental Services Department Prior to Beginning Work

___ Notify Engineer Prior to Beginning Work